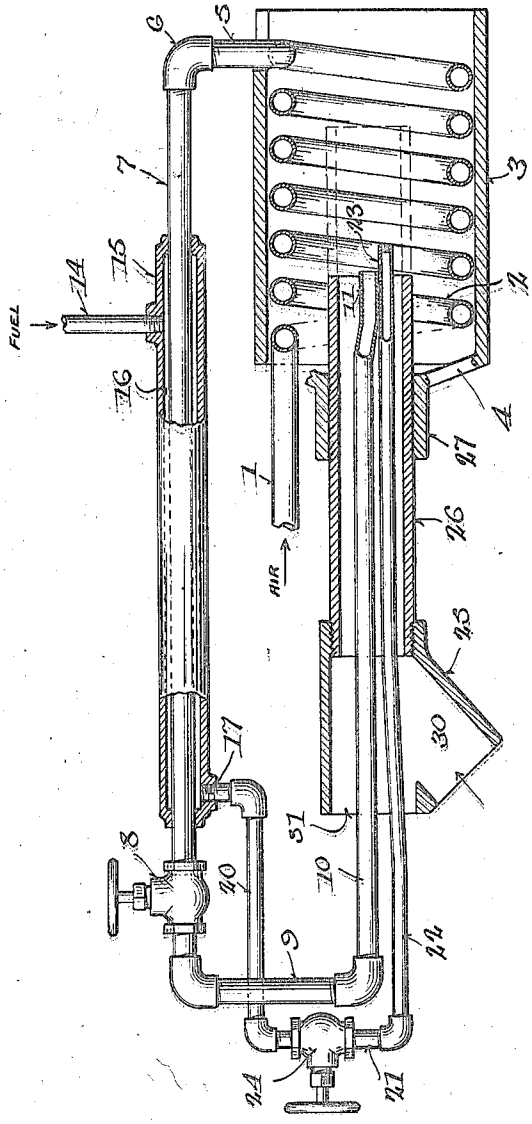
P. W. TRIMBORN AND F. J. BLUM.

OIL BURNER.

APPLICATION FILED JUNE 30, 1919. RENEWED MAR. 29, 1922.

1,433,434. Patented Oct. 24, 1922.



Peter W. Trimborn Inventor
Frank J. Blum
By Evans, Wheeler & Woodard
Attorneys.

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UNITED STATES PATENT OFFICE.

PETER W. TRIMBORN AND FRANK J. BLUM, OF MILWAUKEE, WISCONSIN, ASSIGNORS TO CRUDE OIL GAS SYSTEMS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

OIL BURNER.

Application filed June 30, 1919, Serial No. 307,565. Renewed March 29, 1922. Serial No. 547,927.

To all whom it may concern:

Be it known that we, PETER W. TRIMBORN and FRANK J. BLUM, citizens of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Oil Burners, of which the following is a specification.

Our invention relates to improvements in oil burners of the general type disclosed in former Letters Patent of the United States, No. 1,233,676, dated July 17th, 1917, granted to Ernest O. Linton and Frank J. Blum.

The object of our invention is primarily to overcome difficulties experienced in the use of burners constructed as disclosed in said former patent, due to the carbonization in the fuel heating ducts, we having discovered that such carbonization can be prevented by separately heating the air and the liquid fuel, (heavy hydrocarbon), and allowing the air and vaporized fuel to mix at a nozzle outlet, communicating directly with, or discharging into, the burner.

A further object of our invention is to provide a form of construction in which manufacturing cost will be reduced to a minimum, with increased efficiency and durability as compared with burner structures of this type heretofore made.

The drawing illustrates our invention partly in vertical section, and partly in elevation, with parts assembled in position for use.

Air under pressure is delivered through an inlet duct 1 to a heating coil 2 located within a cylindrical burner 3, the latter having air inlet apertures 4 at its rear end, and the front end being open for the discharge of the burning gases.

The front end of the heating coil is connected with an outlet duct 5, elbowed at 6 and connected with a pipe 7 extending rearwardly along the cylinder 3 and the air inlet pipe 1, preferably parallel, or substantially parallel, thereto. Near its rear end, the pipe 7 is provided with a valve at 8, and beyond this valve it is connected by suitable elbows and a downwardly extending pipe 9, with an air nozzle duct 10, conveying air through the nozzle head 11, the lower end of the duct 10 providing an air passage through the head 11 of which it is a part.

Liquid fuel is delivered from a suitable source of supply through a pipe 14 into the front end portion of a cylinder 15 through which the pipe 7 passes longitudinally. The internal diameter of the cylinder 15 is larger than the diameter of the pipe 7, thereby forming an annular passage 16, along which the liquid fuel may travel to an outlet 17 near the rear end of the cylinder, this outlet being connected by pipe sections 20, 21 and 22 with the nozzle head 11, from which the fuel is discharged into the path of the air blast from the lower end of duct 10. The lower end of the duct 22 also constitutes a portion of the nozzle head, but it extends below the outlet of duct 10, and has a lateral outlet port 23.

It will be observed that the ducts 10 and 22 extend through a fitting 25, which is preferably Y shaped, and threaded upon a relatively large duct 26, slidingly connected with a tubular extension 27 carried by the rear head of the burner cylinder 3. Air from the exterior is admitted to the duct 26 through the passages 30 and 31 in the obliquely extending arm of the fitting 25, whereby the air current delivered through the passage 30 tends to gyrate in the duct 26 and at the nozzle outlet. The duct 26 may be pushed into the burner cylinder 3 to reduce air heating capacity of the coils 2, and retracted to increase it.

It will, of course, be understood that the air blast delivered through the pipe or duct 10 will exert an aspirating effect at the outlet 23 of the fuel duct 22 in the nozzle head, thereby splitting up the fuel vapor, and atomizing unvaporized fuel, if any.

Owing to the fact that the air delivered through the pipe 1 comes from a source of supply under pressure, (the liquid fuel being also preferably delivered, under pressure, through the pipe 14), the mixture will be delivered from the mixing duct 26 to the burner, with considerable velocity, accelerated to some extent by burner suction when the mixture is ignited at the burner outlet. Therefore, a large volume of additional air will be drawn into the burner through the apertures 4, and by proper regulation, through adjustment of the valves at 8 and 24, perfect combustion with a blue flame may be obtained at the burner outlet.

It will be observed that in the structure as above described, the tube or cylinder 15 con-

stitutes a heating chamber, adapted for a preliminary heating of the fuel by absorption of air through the walls of the air pipe 7. The degree of heat absorption by the liquid fuel will depend to some extent upon the length of the cylinder 15, and also to some extent upon the diameter of the annular passage 16, determined by the relative diameters of the pipe 7 and tube 15. It will also depend to some extent upon the velocity of the fuel, and to a less extent upon the velocity of the air. All of these factors should be taken into consideration with reference to the density of the hydrocarbon, although a wide range of variation in proportion may exist, owing to the fact that both the air and fuel are heated very rapidly in the mixing tube 26, and in the burner 3, and also owing to the fact that the valves at 8 and 24 allow the velocity of both the fuel and the air to be readily controlled by valve adjustment.

In the construction illustrated, the air in pipe 7 may be heated to about 800° F. The temperature of the fuel at the outlet of chamber 15 will then be about 360° F. under ordinary operating conditions, and with proper valve adjustments and manual adjustment of duct 26.

The fuel should be heated in the tube 15 to an extent sufficient to vaporize all of it, or substantially all of it, without raising the temperature very far beyond the vaporizing point, and with the construction herein disclosed, it is possible to control this temperature with reasonable accuracy, and by excluding air from the vaporizing chamber, carbonization and the clogging of the ducts or passages may be effectually prevented.

While in the foregoing description of our invention we have referred to the various elements entering into the construction of our improved burner, as pipes and cylinders, elbows and fittings, we wish it understood that these terms are words of description, and not of limitation, it not being our intention to limit the scope of our invention to a structure which is built up from pipe elements, common in the art, as distinguished from a structure in which the various ducts and passages are incorporated in a single body of metal, such, for example, as a casting.

We have also described the duct 1, heating coil 2, and pipe 7, with its associated connections to the nozzle, as used for conveying air under pressure to the nozzle. We wish it understood that these pipe connections may be used to convey steam to the nozzle, in which case the steam will, of course, be superheated in the coils 2. In the construction shown, the steam will be substantially a full equivalent, since a plentiful air supply is provided through the adjustable tube 26, and through the apertures 4. The air delivered through the tube 26 is sufficient to maintain combustion, even though the tube 26 is pushed into the coil toward the burner outlet in such a manner as to completely enclose the nozzle, as is the case when it is found necessary to reduce the heating capacity of the coil. Ignition takes place at the outlet of the tube 26, regardless of the position of the tube within the cylinder 3, except only that when the tube 26 is retracted to expose the nozzle head, no ignition will take place substantially at the nozzle outlet.

We claim:—

1. An oil burner, including the combination of a suction air tube, open at both ends, a compressed air tube leading from a source of air supply under pressure and provided with an outlet at one end of the suction air tube, a fuel supply tube leading through the suction air tube along the compressed air tube and provided with a jet aperture for delivery of fuel into the path of the compressed air, an open ended burner tube surrounding the outlet ends of the other tubes, and means for utilizing the heat of the burner to directly pre-heat the compressed air and to indirectly pre-heat the fuel through the medium of the heated air.

2. An oil burner, including the combination of a suction air tube, open at both ends, a compressed air tube leading from a source of air supply under pressure and provided with an outlet at one end of the suction air tube, a fuel supply tube leading through the suction air tube along the compressed air tube and provided with a jet aperture for delivery of fuel into the path of the compressed air, an open ended burner tube surrounding the outlet ends of the other tubes, and means for utilizing the heat of the burner to directly pre-heat the compressed air and to indirectly pre-heat the fuel through the medium of the heated air, said compressed air duct having a coil within the burner tube and an exterior portion substantially parallel to the burner tube and jacketed by a portion of the supply tube.

3. An oil burner, including the combination of fuel and air supply ducts having their outlet end portions enclosed by an open ended air suction duct and enclosed in turn by an open ended combustion chamber, said air supply duct including a coil within the burner, and said fuel supply duct having a portion in jacket relation to the air supply duct between the burner and the air supply and fuel duct outlets, said jacketing portion of the fuel supply duct having an inlet at one end and an outlet at the other end to cause the fuel to travel longitudinally of the jacket along the air supply duct.

4. An oil burner, including the combina-

tion of fuel and air supply ducts having their outlet end portions enclosed by an open ended air suction duct, and enclosed in turn by an open ended combustion chamber at its outlet portion, said air supply duct including a coil within the burner, and said fuel supply duct having a portion in jacket relation to the air supply duct between the burner and the air supply and fuel outlet ducts, said jacketing portion of the fuel supply duct having an inlet at one end and an outlet at the other, to cause the fuel to travel longitudinally of the jacket along the air supply duct, and valves for both the fuel and air supply ducts between said jacket and the duct outlets.

5. In a burner, the combination with air and fuel supply ducts having outlets arranged for mingling the fuel and air as delivered, an encircling air suction duct, a combustion chamber open at both ends and slidably supported from said air suction duct, means within said combustion chamber for preheating the air to be used in the burner, and air connections for said preheating means adapted to permit the sliding adjustment of said combustion chamber.

In testimony whereof we affix our signatures in the presence of two witnesses.

PETER W. TRIMBORN.
FRANK J. BLUM.

Witnesses:
LEVERETT C. WHEELER,
O. C. WEBER.